Unravelling socioeconomic and regional differences in health and healthcare expenditures in the Netherlands

Impact paragraph

As a society, we believe that everyone should have equal chances for good health independent of where you are born or who you are. However, in the Netherlands a person with low education lives 4 years less and lives 14 years in less good health than someone who is higher educated. Likewise, people have poorer health in some regions in the Netherlands compared to people in other regions. For example, people in South-Limburg live on average 2 year less and 6,4 years in less good health than people in the region Hollands-Midden [1, 2]. In addition, average healthcare costs per person differ regionally. Between the municipalities with the highest and lowest healthcare costs, there was a difference of more than €1770,- (€3625,- in Kerkrade and €1853,- in Urk) [3]. Even after adjusting for age and gender, the difference still remained roughly €1200,- (€3273,- in Heerlen and €2074,- in Roosendaal) [3]. In this research we tried to uncover other factors that can also explain these differences and that, importantly, could be acted upon to achieve more equality. If we know this, we can inform policy makers both regionally and nationally on reducing health inequalities. In terms of healthcare costs, identifying factors that underlie regional differences can be a next step for more informed budget allocations.

This chapter describes the practical relevance and implications of the research presented in this dissertation. The knowledge produced by this research has been disseminated through various channels in the past few years. Common scientific channels included publications in peer-reviewed (inter-)national journals and presentations at conferences. In this dissertation, there has been a strong emphasis on more direct societal impact and knowledge dissemination with policymakers and practice. These efforts were made in collaboration with the Living Lab for Public Health and the Living Lab for Sustainable Care. First, the scientific impact will be described and second the societal impact for policymakers and practice.

Scientific impact

The empirical research in this dissertation was guided by the Barton and Grant Health Map [4]. The contribution of this dissertation is based on simultaneously analyzing both well- and less established determinants of health from various circles in the Health Map. Well-established determinants of health represent demographic, socioeconomic and lifestyle factors in this dissertation. Less established determinants consider loneliness, income inadequacy and mastery. The results of this research are presented in two international publications on loneliness and socioeconomic health inequalities, one international publication on income inadequacy and socioeconomic health inequalities and two national publications on explaining regional health inequalities in the

Netherlands. The research on costs of loneliness was also presented at an international scientific conference. The research has led to four major insights relevant for scholars in the field of socioeconomic health inequalities.

First, the results of these publications and contributions expand the knowledge on the role of loneliness in socioeconomic health inequalities beyond the well-established determinants of health. While most research on loneliness is focused on older age groups, the studies in this dissertation include a broad aged population (19 years and older). This helps us to show that the relationships between loneliness, poor health and high healthcare expenditures are prevalent in all age groups and even stronger for young adults compared to older aged groups, especially for mental health and mental healthcare expenditures. These studies contribute to research about mechanisms involving loneliness, mental health (care), and young adults. The need and relevance of this kind of research has grown since the start of the COVID-19 pandemic as youth and young adults are more vulnerable for developing mental health problems during pandemics [5].

Second, the results of one of the publications show that income inadequacy and absolute income represent two different concepts and both relate to health outcomes independently, especially for mental health. Whereas most studies analyzing associations of income on health incorporate measures of either absolute income or income inadequacy, our results suggest that both play an important part in explaining socioeconomic health inequalities and should hence both be recognized and accounted for in empirical work. In light of the recent energy crisis and its impact on cost of living, we also expect income and income inadequacy to become even more important determinants of health in studying socioeconomic health inequalities.

Third, the results presented in the national publications further explain regional inequalities in health and variations in healthcare expenditures in the Netherlands. Aside from the established determinants such as demographic and socioeconomic factors, other determinants such as lifestyle, loneliness and mastery also help to explain why populations in some regions are unhealthier and have higher healthcare expenditures than populations from other regions. For healthcare expenditures, the research provided a novel analysis of healthcare expenditure data with new insights on regional health differences. This advances our understanding of healthcare expenditures, as it is not purely a function of health but also depends on a broad range of social determinants of health.

Fourth, the research in this dissertation has linked various datasets on individual data concerning health, healthcare expenditures, demographics, socioeconomic and lifestyle factors, loneliness and mastery. The sensitive data were pseudo-anonymized by a trusted third party and linked in a secured digital environment. This data linkage proved a valuable basis for answering complex research questions and has the potential to be expanded with more data to answer other questions in the future.

Societal impact

The research presented in this dissertation impacts society in three different ways, first in contributing to regional government policy development, second, in knowledge transfer with local GP's and third, through knowledge dissemination via various national and regional outlets.

Contribution to regional policy development

Research into health inequalities in Limburg was initiated by the 2015 report 'the Limburg-factor' [6]. This report helped the Province of Limburg with developing the policy program 'the Social Agenda'. The Social Agenda aims to close the gap in health inequalities between Limburg and the Netherlands based on five major themes: youth, education, labor, health, and social capital. The Province of Limburg wanted to monitor the Social Agenda which resulted in two grants for two evaluation studies, one in 2018 (baseline) and one in 2022 (first evaluation). These evaluation studies were executed in addition to the studies presented in this dissertation. Both evaluations required a multitude of data sources to reflect on trends over time in the Netherlands and in Limburg for the five themes. To do this, multiple stakeholders were involved such as Statistics Netherlands, the national and regional Public Health Services, Perined (registration of perinatal health data), the Research Centre for Education and the Labour Market, and the Education Monitor Limburg (OnderwijsMonitor Limburg). The subsequent reports for these studies ([7] in 2018 and [8] in 2022) showed that Limburg, more specifically the South of Limburg, faces disadvantages in every theme of the Social Agenda. The results show the urge for more preventive, cross-domain investments on the long-term. The recommendations from these reports are used as input for further policy development in the Province of Limburg for the period 2018-2022 and 2022-2026. The results of the 2018 report received media attention in the daily newspaper The Limburger and have also been used in the development of the regional health agreement for the South of Limburg in 2018 [9] and 2022. Furthermore, the results of the 2018 report contributed to the development of a new public health program in the South of Limburg (Trendbreuk Zuid-Limburg [10]). This prevention program prioritizes the (pre)conception phase, (pre)natal care, (young) children in primary, secondary and vocational schools and parenthood according to the lifecycle approach. In the process

of writing both reports, various presentations were given for the Provincial government, the regional and national Public Health Service and local stakeholders in the field of the labor market, societal participation, education, and public health. As part of the 2022 evaluation, three focus groups were organized with local stakeholders in the field of 1) youth and education, 2) the labor market and societal participation and 3) health and social capital in order to co-create recommendations for further policy development of the Social Agenda as of 2023 [11].

The Council for Public Health and Society (Raad voor Volksgezondheid en Samenleving, RVS) has consulted South Limburg about their regional approach, which has resulted in the advisory report of RVS, titled "A fair chance for a healthy life" [12]. The ministry of Health, Welfare and Sport (VWS) and the ministry of the Interior (Binnenlandse Zaken) visited the region several times to obtain information about health inequalities and to consider making additional investments in the region. This finally resulted, in cooperation with many other partners (housing, labor, welfare, health, education), in the "Region deal for Parkstad", a grant of the national government to increase prosperity.

Knowledge transfer with local GP's

For most health outcomes and healthcare costs categories, regional health inequalities are explained with the addition of a broad range of socioeconomic factors in this dissertation. However, GP consultation expenditures in the South of Limburg remained inexplicably high compared to all other regions in the Netherlands. In order to provide more answers for this phenomenon, interviews were conducted with local GP's. The interviews served two purposes. First, the GP's were informed about the research results underlying the importance of social determinants of health for regional variations in health and healthcare expenditures. Second, the GP's were invited to share other explanations for higher GP consultation expenditures in the South of Limburg in order to inform future policy and research agendas. The interviews helped shed light on upstream socioeconomic and cultural determinants of health that are difficult to address with public health policies. Furthermore, the interviews helped contextualize the findings and (partially) destigmatize the South Limburg population.

Knowledge dissemination via various (inter-)national and regional outlets

Finally, the results presented in this dissertation were shared with society through several channels such as (social) media, websites, newsletters and presentations. A presentation about the costs of loneliness was given for the national program JoinUs in the learning event Stronger Together during the Week against Loneliness in 2021 [13]. JoinUs aims to combat loneliness in young adults [14]. The results of the study were also presented at the international conference Campaign to End Loneliness in

2023. The study on costs of loneliness also received media attention in various national outlets such as NRC, the Telegraaf, Nu.nl and in the regional newspaper The Limburger. Two interviews were given about this study, resulting in an article in the Zorg+Welzijn magazine [15] (magazine for professionals in the social domain) and in the newsletter for the Living Lab for Public Health [16].

The results of the research on regional health inequalities and regional variations in healthcare expenditures were deliberately published in a Dutch peer-reviewed journal in order to increase the research's impact on the national discussion of health inequalities. The two studies became part of the special issue 'socioeconomic health inequalities: radical change in course required'. In addition, English translations for both articles were published for international readers. These results were presented, along with the results from the 2022 report [8], at a public event at the Social Historic Centre for Limburg. These results were also shared in 2019 and 2022 with presentations at the local healthcare network the 'Mijnstreek coalition'. Both reports [7, 8] are published on the Maastricht University website and the Living Lab for Public Health website. For both reports, interviews were given which resulted in news items for the Living Lab for Public Health newsletter. Furthermore, the findings contributed to the goals of the Knowledge and Innovation Agenda Southeast Netherlands 2030 [17]. The agenda was initiated in 2020 with four major goals to improve population health and healthcare in Southeast Netherlands (the region of Southeast Brabant and the province of Limburg) by 2030. One of the four goals focuses on narrowing the gap in socioeconomic health inequalities. The first sub goal is to gain insight in the influence of demographic and socioeconomic trends on health inequalities in this region. The research in this dissertation provides this insight and show that with a broader set of determinants of health, we are able to explain regional health inequalities in mental health, total healthcare costs, specialized care costs, mental healthcare costs and pharmaceutical costs.

The insights on regional health inequalities and variations in healthcare expenditures are also presented in a Dutch web-based tool [18]. This website provides policymakers and health insurers with insights about regional inequalities in health and variations in healthcare expenditures for each region in the Netherlands. An instructional video was developed for this website to help policymakers and health insurers understand and use the research findings in their own day-to-day practice. In addition, the results in Chapter 6 have helped health insurers in updating their regional reports [19].

Finally, based on questions from stakeholders in local government and vocational education, a factsheet was written on health inequalities in student populations in the South of Limburg. The factsheet showed that vocationally trained students (MBO niveau

1, 2, 3 and 4) are at higher risk of facing difficulties in life compared to students in higher tertiary education (HBO) or university (WO). MBO-students are more often raised in single parent families, incur higher healthcare expenditures, are more often unemployed, are more often faced with sexual transmitted diseases and unplanned and/or unwanted pregnancies, and more often report poorer health, unhealthier lifestyles and inadequate incomes compared to HBO- or WO-students. The results were presented at a regional conference and helped legitimize the financing of introducing accessible help and care within vocational school facilities in Zuid-Limburg (MBO Knooppunt [20]) and provided a steppingstone to investigate whether citizenship education can be implemented to reduce these disadvantages (ZonMw grant).

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